

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A speech and music signal coder for producing a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal which is provided by adding a first excitation signal ~~in correspondence with corresponding to~~ a first band of an input signal and a second excitation signal ~~in correspondence with corresponding to~~ a second band of the input signal, said linear prediction synthesis filter setting with a linear prediction coefficient calculated on the basis of said input signal, said speech and music signal coder comprising: reproduction signal generating means for reproducing a first reproduction signal by driving the linear prediction synthesis filter in response to the excitation signal ~~in correspondence with corresponding to~~ the first band; residual signal generating means for generating a residual signal by driving a linear prediction inverse filter in response to a differential signal indicative of a difference between the input signal and the first reproduction signal and; coding means for coding a component ~~in correspondence with corresponding to~~ the second band in the residual signal after orthogonal transformation of the component.

2. (Currently Amended) A speech and music signal coder for producing a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal which is provided by adding 3 pieces of excitation signals ~~in correspondence with corresponding to~~ 3 pieces of bands, said speech and music signal coder comprising, said linear prediction synthesis filter setting with a linear prediction coefficient calculated on the basis of said input signal, said speech and music signal coder comprising: reproduction signal generating means for

generating a first and a second reproduction signal by driving the linear prediction synthesis filter in response to the excitation signals ~~in correspondence with corresponding to~~ a first one and a second one of the bands; and coding means for generating a residual signal by driving a linear prediction inverse filter in response to a differential signal indicative of a difference between an added signal produced by adding the first and the second reproduction signals and the input signal and for coding a component ~~in correspondence with corresponding to~~ a third one of the bands in the residual signal after orthogonal transformation of the component.

3. (Currently Amended) A speech and music signal coder for producing a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal which is provided by adding N pieces of excitation signals ~~in correspondence with corresponding to~~ N pieces of bands, said speech and music signal coder comprising: reproduction signal generating means for generating a first through an (N-1)-th reproduction signal by driving the linear prediction synthesis filter in response to the excitation signals ~~in correspondence with corresponding to~~ a first through and (N-1)-th band; and N-th coding means for generating a residual signal by driving a linear prediction inverse filter in response to a differential signal indicative of difference between a signal produced by adding the first through the (N-1)-th reproduction signals and the input signal and for coding a component ~~in correspondence with corresponding to~~ an N-th band in the residual signal after orthogonal transformation of the component.

4. (Currently Amended) A speech and music signal coder for producing a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal which is provided by adding 2 pieces of excitation

signals ~~in correspondence with~~ corresponding to 2 pieces of bands, said speech and music signal coder comprising: means for calculating a difference of a first coded decoding signal and the input signal; and coding means for generating a residual signal by driving a linear prediction inverse filter in response to the differential signal and for coding a component ~~in correspondence with~~ corresponding to an arbitrary one of the bands in the residual signal after subjecting the component to orthogonal transformation.

5. (Currently Amended) A speech and music signal coder for generating a reproduction signal by driving a linear prediction synthesis filter calculated on the basis of an input signal in response to an excitation signal provided by adding 3 pieces of excitation signals ~~in correspondence with~~ corresponding to 3 pieces of bands, said speech and music signal coder comprising: means for calculating a differential signal indicative of difference between a signal produced by adding a first and a second coded decoding signal and the input signal; and coding means for generating a residual signal by driving a linear prediction inverse filter calculated on the basis of the input signal by the differential signal and for coding a component ~~in correspondence with~~ corresponding to an arbitrary band in the residual signal after orthogonal transformation of the component.

6. (Currently Amended) A speech and music signal coder for producing a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal which is provided by adding N pieces of excitation signals ~~in correspondence with~~ corresponding to N pieces of bands, said speech and music signal coder comprising: differential signal calculating means for calculating a differential signal indicative of difference between a signal produced by adding a first

through an (N-1)-th coded decoding signal and the input signal; and N-th coding means for generating a residual signal by driving an inverse filter of the linear prediction synthesis filter on the basis of the input signal in response the differential signal and for coding a component ~~in correspondence with~~ corresponding to an arbitrary band in the residual after orthogonal transformation of the component.

7. (Currently Amended) The speech and music signal coder as claimed in claim 1, wherein: a pitch prediction filter is used in generating the excitation signal ~~in correspondence with~~ corresponding to the first band of the input signal.

8. (Currently Amended) A speech and music signal coder comprising: second input signal generating means for generating a second input signal by down-sampling a first input signal sampled at a first sampling frequency to a second sampling frequency; first reproduction signal generating means for generating a first reproduction signal by driving a synthesis filter set with a first linear prediction coefficient calculated on the basis of the second input signal in response to an excitation signal; second reproduction signal generating means for generating a second reproduction signal by up-sampling the first reproduction signal to the first sampling frequency; third linear prediction coefficient calculating means for calculating a third linear prediction coefficient on the basis of a difference of the first linear prediction coefficient and a second linear prediction coefficient provided by converting a sampling frequency to the first sampling frequency; residual signal generating means for calculating a fourth linear prediction coefficient on the basis of a sum of the second linear prediction coefficient and the third linear prediction coefficient and for generating a residual signal by driving an inverse filter set with the fourth linear prediction coefficient on the basis of a differential signal indicative

of difference between the first input signal and the second reproduction signal; and coding means for coding a component ~~in correspondence with~~ corresponding to an arbitrary band in the residual signal after orthogonal transformation of the component.

9. (Currently Amended) A speech and music signal decoder for generating a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal provided by adding an excitation signal ~~in correspondence with~~ corresponding to a first band and an excitation signal ~~in correspondence with~~ corresponding to a second band, said speech and music signal decoder comprising: excitation signal generating means for generating the excitation signal ~~in correspondence with~~ corresponding to the second band by subjecting a ~~decoding signal and an~~ decoded orthogonal transformation coefficient to orthogonal inverse transformation; second reproduction signal generating means for generating a second reproduction signal by driving the linear prediction synthesis filter in response to the excitation signal corresponding to the second band; first reproduction signal generating means for generating a first reproduction signal by driving the linear prediction filter in response to the excitation signal ~~in correspondence with~~ corresponding to the first band; and speech and music decoded signal generating means for generating speech and music decoded signal by adding the first reproduction signal and the second reproduction signal.

10. (Currently Amended) A speech and music signal decoder for generating a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal provided by adding 3 pieces of excitation signals ~~in correspondence with~~ corresponding to a first through a third band, said speech and

music signal decoder comprising: first and second reproduction signal generating means for generating a first and a second reproduction signal by driving the linear prediction filter in response to the excitation signals ~~in correspondence with corresponding to~~ the first and the second bands; third reproduction signal generating means for generating the excitation signal ~~in correspondence with corresponding to~~ the third band by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation, and for generating a third reproduction signal by driving the linear prediction synthesis filter in response to the excitation signal; and speech and music decoded signal generating means for generating a speech and music decoded signal by adding the first through the third reproduction signals.

11. (Currently Amended) A speech and music signal decoder for generating a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal provided by adding N pieces of excitation signals ~~in correspondence with corresponding to~~ first through an N-th band, said speech and music signal decoder comprising: N-th reproduction signal generating means for generating an excitation signal ~~in correspondence with corresponding to~~ the N-th band by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation and for generating an N-th reproduction signal by driving the linear prediction synthesis filter in response to the excitation signal; first through (N-1)-th reproduction signal generating means for generating a first through an (N-1)-th reproduction signal by driving the linear prediction filter in response to the excitation signals ~~in correspondence with corresponding to~~ the first through the (N-1)-th bands; and speech and music decoded signal generating means for generating

a speech and music decoded signal by adding the first through the N-th reproduction signals.

12. (Currently Amended) A speech and music signal decoder for generating a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal provided by adding excitation signals ~~in correspondence with corresponding to~~ a first and a second band, said speech and music signal decoder comprising: reproduction signal generating means for generating an excitation signal by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation and for generating a second reproduction signal by driving a linear prediction synthesis filter by the excitation signal; and speech and music decoded signal generating means for generating a speech and music decoded signal by adding the second reproduction signal and a first reproduction signal from first reproduction signal generating means.

13. (Currently Amended) A speech and music signal decoder for generating a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal provided by adding excitation signals ~~in correspondence with corresponding to~~ a first through a third band, said speech and music signal decoder comprising: third reproduction signal generating means for generating the excitation signal by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation and for generating a third reproduction signal by driving the linear prediction synthesis filter in response to the excitation signal; and speech and music signal generating means for generating a speech and music signal by adding a first and a second reproduction signal respectively outputted from first and second reproduction signal generating means.

14. (Currently Amended) A speech and music signal decoder for generating a reproduction signal by driving a linear prediction synthesis filter in response to an excitation signal provided by adding N pieces of excitation signals ~~in correspondence with corresponding to~~ a first through an N-th band; N-th reproduction signal generating means for generating the excitation signal by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation and for generating an N-th reproduction signal by driving the linear prediction synthesis filter in response to the excitation signal; and speech and music decoded signal generating means for generating a speech and music decoded signal by adding the N-th reproduction signal and a first through an (N-1)-th reproduction signal.

15. (Currently Amended) A speech and music signal decoder as claimed in claim 9, wherein a pitch prediction filter is used in generating the excitation signal ~~in correspondence with corresponding to~~ the first band.

16. (Currently Amended) A speech and music signal decoder comprising: first reproduction signal generating means for up-sampling a signal provided by driving a first linear prediction synthesis filter in response to a first excitation signal ~~in correspondence with corresponding to~~ a first band to a first sampling frequency and for generating a reproduction signal; second reproduction signal generating means for generating a second excitation signal ~~in correspondence with corresponding to~~ a second band by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation and for generating a second reproduction signal by driving a second linear prediction synthesis filter in

response to the second excitation signal; and speech and music decoded signal by adding the first and the second reproduction signal.

17-24 (Canceled)

25. (Currently Amended) A speech and music signal coding/decoding apparatus comprising:

a speech and music signal coder that produces a coded signal by driving a first linear prediction synthesis filter in response to a first excitation signal which is provided by adding a first signal corresponding to a first band of an input signal and a second signal corresponding to a second band of the input signal, said linear prediction synthesis filter being set with a linear prediction coefficient calculated on the basis of said input signal, said speech and music signal coder comprising:

a reproduction signal generating circuit producing a reproduction signal by driving the first linear prediction synthesis filter in response to the first signal corresponding to the first band of the input signal;

a residual signal generating circuit generating a residual signal by driving a linear prediction inverse filter in response to a differential signal indicative of a difference between the first input signal and the reproduction signal; and

a coding circuit coding a component ~~in correspondence with~~ corresponding to the residual signal after orthogonal transformation of the component; and

a speech and music signal decoder that decodes the coded signal of the signal coder by driving a second linear prediction synthesis filter in response to a second excitation signal provided by adding a first signal corresponding to a first band of the second excitation signal and a second signal corresponding to a second

band of the second excitation signal, said speech and music signal decoder comprising:

an excitation signal generating circuit generating the second signal corresponding to the second band of the second excitation signal by subjecting a decoding signal and an orthogonal transformation coefficient to orthogonal inverse transformation;

a second reproduction signal generating circuit generating a second reproduction signal by driving the second linear prediction synthesis filter in response to the second excitation signal;

a third reproduction signal generating circuit generating a third reproduction signal by driving the second linear prediction synthesis filter in response to the first signal corresponding to the first band of the second excitation signal; and

a speech and music decoded signal generating circuit generating a speech and music decoded signal by adding the second reproduction signal and the third reproduction signal.

26. (Currently Amended) A speech and music signal coding/decoding apparatus comprising:

a speech and music signal coder that produces a coded signal by driving a first linear prediction synthesis filter in response to a first excitation signal which is provided by adding 3 pieces of excitation signals ~~in correspondence with~~ corresponding to 3 pieces of bands, said first linear prediction synthesis filter being set with a linear prediction coefficient calculated on the basis of an input signal, said speech and music signal coder comprising:

a first reproduction signal generating circuit generating a first and a second reproduction signal by driving the first linear prediction synthesis filter in response to the excitation signals ~~in correspondence with~~ corresponding to a first one and a second one of the bands; and

a coding circuit generating a residual signal by driving a linear prediction inverse filter in response to a differential signal indicative of a difference between an added signal produced by adding the first and the second reproduction signals and the input signal and coding a component ~~in correspondence with~~ corresponding to a third one of the bands in the residual signal after orthogonal transformation of the component; and

a speech and music signal decoder that decodes the coded signal of the signal coder by driving a second linear prediction synthesis filter in response to a second excitation signal provided by adding 3 pieces of excitation signals ~~in correspondence with~~ corresponding to a first through a third band, said speech and music signal decoder comprising:

a second reproduction signal generating circuit generating a third and a fourth reproduction signal by driving the second linear prediction filter in response to the second excitation signals ~~in correspondence with~~ corresponding to the first and the second bands;

a third reproduction signal generating circuit generating the second excitation signal ~~in correspondence with~~ corresponding to the third band by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation, and generating a fifth reproduction signal by driving the second linear prediction synthesis filter in response to the second excitation signal; and

a speech and music decoded signal generating circuit generating a speech and music decoded signal by adding the third through the fifth reproduction signals.

27. (Currently Amended) A speech and music signal coding/decoding apparatus comprising:

a speech and music signal coder that produces a coded signal by driving a first linear prediction synthesis filter in response to a first excitation signal which is provided by adding N pieces of excitation signals ~~in correspondence with~~ corresponding to N pieces of bands of an input signal, said speech and music signal coder comprising:

a first reproduction signal generating circuit generating a first through an (N-1)-th first reproduction signal by driving the first linear prediction synthesis filter in response to the first excitation signals ~~in correspondence with~~ corresponding to a first through an (N-1)-th band; and

an N-th coding circuit generating a residual signal by driving a linear prediction inverse filter in response to a differential signal indicative of a difference between a signal produced by adding the first through the (N-1)-th first reproduction signals and the input signal and coding a component ~~in~~ correspondence with corresponding to an N-th band in the residual signal after orthogonal transformation of the component; and

a speech and music signal decoder that decodes the coded signal of the signal coder by driving a second linear prediction synthesis filter in response to a second excitation signal provided by adding N pieces of excitation signals ~~in~~

~~correspondence with corresponding~~ to first through an N-th band, said speech and music signal decoder comprising:

an N-th reproduction signal generating circuit generating a reproduction signal ~~in correspondence with corresponding~~ to the N-th band by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation and generating an N-th reproduction signal by driving the second linear prediction synthesis filter in response to the second excitation signal;

a first through (N-1)-th second reproduction signal generating circuit generating a first through an (N-1)-th second reproduction signal by driving the second linear prediction synthesis filter in response to the second excitation signals ~~in correspondence with corresponding~~ to the first through the (N-1)-th bands; and

a speech and music decoded signal generating circuit generating a speech and music decoded signal by adding the first through the (N-1)-th second reproduction signals.

28. (Currently Amended) A speech and music signal coding/decoding apparatus comprising:

a speech and music signal coder that produces a coded signal by driving a first linear prediction synthesis filter in response to a first excitation signal which is provided by adding 2 pieces of excitation signals ~~in correspondence with corresponding~~ to 2 pieces of bands, said speech and music signal coder comprising:

a difference circuit calculating a difference of a first coded decoding signal and an input signal; and

a coding circuit generating a residual signal by driving a linear prediction inverse filter in response to the differential signal and coding a

component ~~in correspondence with~~ corresponding to an arbitrary one of the bands in the residual signal after subjecting the component to orthogonal transformation; and

a speech and music signal decoder that decodes the coded signal of the signal coder by driving a second linear prediction synthesis filter in response to a second excitation signal provided by adding excitation signals ~~in correspondence with~~ corresponding to a first and a second band, said speech and music signal decoder comprising:

a reproduction signal generating circuit generating a first reproduction signal by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation and generating a second reproduction signal by driving a third linear prediction synthesis filter by the first reproduction signal; and

a speech and music decoded signal generating circuit generating a speech and music decoded signal by adding the second reproduction signal and the first reproduction signal from reproduction signal generating circuit.

29. (Currently Amended) A speech and music signal coding/decoding apparatus comprising:

a speech and music signal coder that produces a coded signal by driving a first linear prediction synthesis filter in response to an excitation signal provided by adding 3 pieces of excitation signals ~~in correspondence with~~ corresponding to 3 pieces of bands of an input signal, said speech and music signal coder comprising:

a difference circuit calculating a differential signal indicative of difference between a signal produced by adding a first and a second coded decoding signal and the input signal; and

a coding circuit generating a residual signal by driving a linear prediction inverse filter calculated on the basis of the input signal and the differential signal, and coding a component ~~in correspondence with corresponding to~~ an arbitrary band in the residual signal after orthogonal transformation of the component; and

a speech and music signal decoder that decodes the coded signal of the signal coder by driving a second linear prediction synthesis filter in response to a second excitation provided by adding excitation signals ~~in correspondence with corresponding to~~ a first through a third band, said speech and music signal decoder comprising:

a first reproduction signal generating circuit generating a first reproduction signal by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation;

a second reproduction signal generating circuit generating a second reproduction signal by driving the second linear prediction synthesis filter in response to the first reproduction signal; and

a speech and music signal generating circuit generating a speech and music signal by adding the first and a second reproduction signals generated by the first and second reproduction signal generating circuit.

30. (Currently Amended) A speech and music signal coding/decoding apparatus comprising:

a speech and music signal coder that produces a coded signal by driving a first linear prediction synthesis filter in response to a first excitation signal which is provided by adding N pieces of excitation signals ~~in correspondence with~~

corresponding to N pieces of bands of an input signal, said speech and music signal coder comprising:

a differential signal calculating circuit calculating a differential signal indicative of difference between a signal produced by adding a first through an (N-1)-th coded decoding signal and the input signal; and

an N-th coding circuit generating a residual signal by driving an inverse filter of the first linear prediction synthesis filter on the basis of the input signal in response the differential signal and coding a component ~~in correspondence with~~ corresponding to an arbitrary band in the residual signal after orthogonal transformation of the component; and

a speech and music signal decoder that decodes the coded signal of the signal coder by driving a second linear prediction synthesis filter in response to a second excitation signal provided by adding N pieces of excitation signals ~~in correspondence with~~ corresponding to a first through an N-th band; said speech and music signal decoder comprising:

an N-th reproduction signal generating circuit generating a first reproduction signal by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation and generating an N-th reproduction signal by driving the second linear prediction synthesis filter in response to the first reproduction signal; and

a speech and music decoded signal generating circuit generating a speech and music decoded signal by adding the N-th reproduction signal and a first through an (N-1)-th reproduction signal.

31. (Currently Amended) A speech and music signal coding/decoding apparatus as claimed in claim 25, wherein:

the speech and music signal coder further comprises a first pitch prediction filter that generates the first signal corresponding to the first band of the input signal; and

the speech and music signal decoder further comprises a second pitch prediction filter that generates the first signal corresponding to the first band of the second excitation signal.

32. (Currently Amended) A speech and music signal coding/decoding apparatus comprising:

a speech and music signal coder comprising:

an input signal generating circuit generating an input signal by down-sampling a sampling signal sampled at a first sampling frequency to a second sampling frequency;

a first reproduction signal generating circuit generating a first reproduction signal by driving a synthesis filter set with a first linear prediction coefficient calculated on the basis of the input signal in response to a first excitation signal;

a second reproduction signal generating circuit generating a second reproduction signal by up-sampling the first reproduction signal to the first sampling frequency;

a linear prediction coefficient calculating circuit calculating a first linear prediction coefficient on the basis of a difference between a second linear prediction

coefficient and a third linear prediction coefficient provided by converting a sampling frequency to the first sampling frequency;

a residual signal generating circuit calculating a fourth linear prediction coefficient on the basis of a sum of the third linear prediction coefficient and the first linear prediction coefficient and generating a residual signal by driving an inverse filter set with a fourth linear prediction coefficient calculated on the basis of a differential signal indicative of difference between the sampling signal and the second reproduction signal; and

a coding circuit coding a component ~~in correspondence with~~ corresponding to an arbitrary band in the residual signal after orthogonal transformation of the component; and

a speech and music signal decoder comprising:

a third reproduction signal generating circuit up-sampling a signal provided by driving a second linear prediction synthesis filter in response to a second excitation signal ~~in correspondence with~~ corresponding to a first band to a third sampling frequency and generating a third reproduction signal;

a fourth reproduction signal generating circuit generating a second excitation signal ~~in correspondence with~~ corresponding to a second band by subjecting a decoded orthogonal transformation coefficient to orthogonal inverse transformation and generating a fourth reproduction signal by driving a third linear prediction synthesis filter in response to the second excitation signal; and

a speech and music decoded signal generating circuit generating a speech and music decoded signal by adding the third and the fourth reproduction signal.